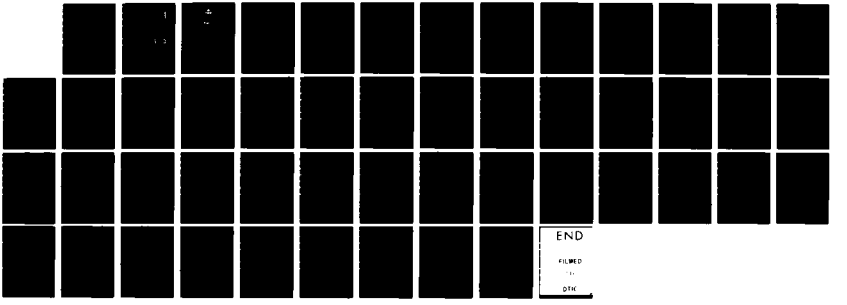
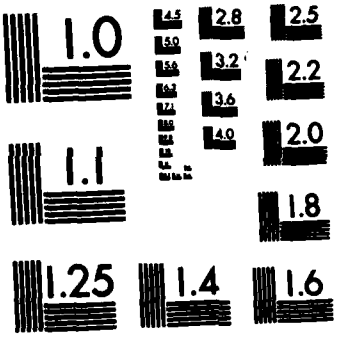
AD-A124 187 READINESS CONTROL CENTER CAPABILITY TRANSFER EVALUATION 1/1
(U) BATTELLE COLUMBUS LABS OH K V MILLER ET AL.
02 FEB 81FF33600-80-C-0414

UNCLASSIFIED F/G 5/1 NL





PHOTOGRAPH THIS SHEET

DTIC ACCESSION NUMBER

AD A124187

LEVEL

II

INVENTORY

I

Readiness Control Center Capability Transfer Evaluation

DOCUMENT IDENTIFICATION

2 Feb. 81

Contract F33600-80-C-0414

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited

DISTRIBUTION STATEMENT

ACCESSION FOR	
NTIS	GRA&I
DTIC	TAB
UNANNOUNCED	
JUSTIFICATION	
BY	Per Ltr. on file
DISTRIBUTION / AVAILABILITY CODES	
DIST	AVAIL AND/OR SPECIAL
A	

DISTRIBUTION STAMP

DTIC COPY INSPECTED 2

DTIC
ELECTE
S FEB 8 1983 D
D

DATE ACCESSIONED

83 02 07 103

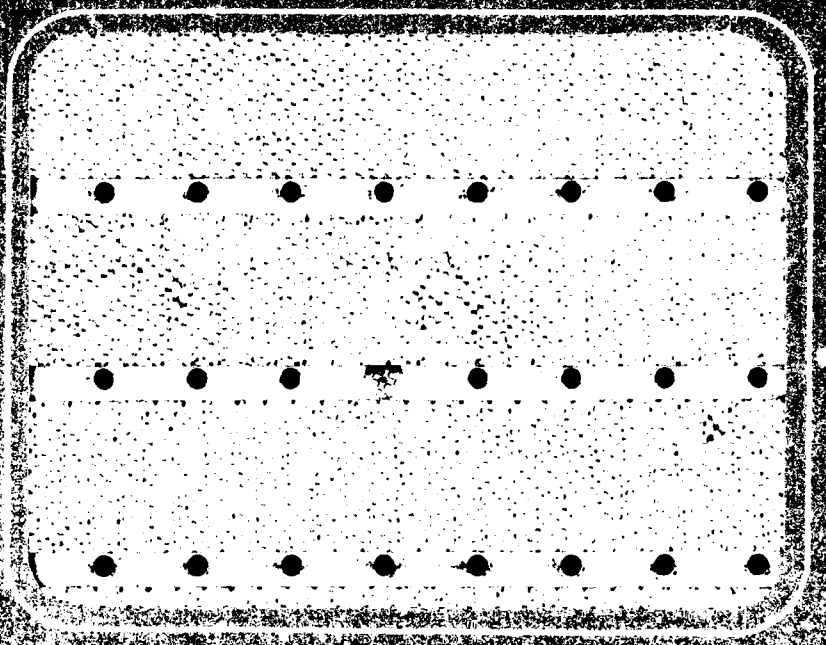
DATE RECEIVED IN DTIC

PHOTOGRAPH THIS SHEET AND RETURN TO DTIC-DDA-2

DOCUMENT PROCESSING SHEET

DTIC FORM OCT 79 70A

87D



REPORT

on

READINESS CONTROL CENTER CAPABILITY TRANSFER EVALUATION

to

DIRECTORATE OF LOGISTICS MANAGEMENT
SYSTEM REQUIREMENT (XRB)
DCS/PLANS AND PROGRAM
AIR FORCE LOGISTICS COMMAND
WRIGHT PATTERSON AFB, OHIO 45433

(Contract No. F-33600-80-C-0414)

February 2, 1981

by

K. V. Miller, J. D. Hill, and M. Kluse

BATTELLE
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

PREFACE

This report contains the results of a meeting held at the Ogden ALC to evaluate the potential for transfer to the other ALCs of three software packages developed by the Readiness Control Center at Ogden. This meeting was hosted by AFLC LO/XR, and took place January 13-15, 1981.

This effort was directed toward providing some interim management system enhancements to the System Managers while the long-range Logistics Management System Planning activity is dealing in depth with the Weapon System Management area.

ACKNOWLEDGMENT

The authors wish to thank LTC Fred Healea, LOACF, and Mr. D. Tucker, XRB, for their active participation in the preparation for and the conduct of the meeting. The support of the personnel from the Readiness Control Center in providing the facilities for the meeting and presenting extensive information concerning the capabilities to be evaluated also is appreciated.

TABLE OF CONTENTS

LIST OF FIGURES

TABLE OF CONTENTS (Continued)

REPORT

on

READINESS CONTROL CENTER CAPABILITY TRANSFER EVALUATION

to

DIRECTORATE OF LOGISTICS MANAGEMENT
SYSTEM REQUIREMENT (XRB)
DCS/PLANS AND PROGRAM
AIR FORCE LOGISTICS COMMAND
WRIGHT-PATTERSON AFB, OHIO 45433

February 2, 1981

by

K. V. Miller, J. D. Hill, and M. Kluse

Contract No. F33600-80-C-0414

Battelle
Columbus Laboratories

INTRODUCTION

The Air Force Logistics Command basically manages by item rather than by system. There is a recurring need to aggregate the Command's information by weapon systems for reporting to Congress and to assess the impacts of funding and deployment changes. Few management systems currently exist to aid the systems manager in these tasks. In the long-range Logistics Management System (LMS) planning activity being guided by Battelle, the above Weapon System Management area was identified as a first-start area.

It is clear that the long-range LMS planning process will take at least a year before the requirements for any management system can be identified clearly enough to begin the Data Automation Requirement (DAR) process. Because of the initiatives taken by the Readiness Control Center (RCC) at Ogden in supporting the System Management function, Battelle was asked to review some software Ogden had developed to determine if any or all of it might be transferrable to other Air Logistics Centers to enhance the System Managers' capabilities on an interim basis.

In order to be considered for transfer, the software packages had to be fully developed, implemented, documented, and transferable without significant modification. These limitations are necessary to provide the ALC's System Managers with near-term capabilities that are of the most benefit with minimum technical risk.

The procedures developed by Battelle were designed to evaluate the software packages on the basis of utility to the systems in terms of both system performance and system management (operational impact) and the ease of ADP transfer (technical risk).

OBJECTIVE

The objective of the reported effort has been to provide a structure for the evaluation of three RCC-developed software packages to determine if any or all of them could provide interim support for the ALC's System Managers to enhance their capabilities until results of the long-range Weapon Systems Management planning activity (a first step in the long-range Logistics Management System) are available.

PROCEDURES

BG Leo Marquez originated the concept of providing ALC System Managers with interim support, consisting of software packages that have been developed by the Ogden ALC's Readiness Control Center (RCC). General Marquez requested that Battelle review the RCC software packages to determine if any or all of them were transferrable to System Managers in the other ALCs. As a part of their work on development of the long-range Logistics Management System (LMS) planning activity, Battelle responded to General Marquez's request in September 1980, visiting the Ogden ALC for briefings on the several software packages that are in various stages of development there. The Battelle staff then reported to General Marquez on the candidate packages that might be suitable for transfer to the other ALCs. Subsequently, Battelle was asked to pursue the matter further.

The principal task was to establish criteria to evaluate the software packages, to apply these criteria to the candidate packages, and to thereby recommend packages for transfer to the other ALCs. It was decided that a review of the packages by ALC representatives would be the best technique for evaluating packages for transfer, considering these representative's awareness of the ALC environment. LOACF and XRB personnel worked with Battelle staff to arrange and schedule the evaluation process. This schedule is given in Appendix A. Each of the scheduled tasks completed thus far are discussed in the following sections.

Identify Meeting Participants

Each ALC was asked to identify an experienced system manager who would be able to evaluate the RCC software packages in terms of utility to the SM and to provide one representative for a meeting scheduled to be held at Ogden ALC. The meeting agenda and participants are shown in Appendix B.

Define the Criteria for Transfer Packages

Since the objective of this effort was to provide increased interim support for the SM, the candidate capabilities to be evaluated were intended

to be fully developed and documented. The Ogden RCC was asked to recommend packages for evaluation, based on these overall guidelines and with an additional stipulation that the capabilities be as universal as possible (i.e., not applicable only to a select group of weapon systems).

Identify Existing Hardware

In order to assess the initial ADP environment within which these systems would have to operate at each ALC, knowledgeable representatives of the ALCs participated. Their function was to evaluate the hardware requirements associated with each software package and to scope the degree of difficulty associated with the technical transfer. While hardware was not to be the deciding factor, lack of its availability could cause significant schedule delays in transferring software.

BCL staff offered technical assistance and several of the ALCs sent representatives to Ogden ALC to assess the required capabilities and report on hardware available at their ALCs.

Structure the Meeting

A two-stage approach was designed by BCL for the evaluation process. The first stage consisted of an information exchange session. Each software package was briefly described by the Ogden RCC to acquaint the representatives from the ALCs with the overall function of that package. The evaluation group then split into two separate sessions. One group assessed the package in terms of its operational impact, or utility to the System Manager, while the other group assessed the technical, hardware, and software implications. Each group went through a structured questioning process that addressed 14 information categories, such as data structure and man-machine interface, in some detail (Appendices C and D). Three separate packages were examined: a Combat Support Capability Management System (CSCMS), a Modification Tracking System, and a MICAP analysis routine.

The second stage followed the information exchange sessions on the individual packages and consisted of a comparative evaluation process. Using a system merit evaluation tree, the various packages were ranked one, two, and

three; first in the area of technical risk (one being the least risk) and then in the area of performance impact (one having the greatest positive impact). After ranking the packages relatively, an absolute evaluation for the number one system was identified.

Following the meeting, the unweighted calculation of the performance and risk areas was used to illustrate how to situate the packages on a matrix of performance/risk. To be considered for transfer, a package should fall toward the upper-left of such a matrix. The results of this sample evaluation are presented in the following section.

EVALUATION RESULTS

As indicated previously, the session participants were requested to evaluate both the relative risk associated with transferring the three RCC developed systems and the relative performance impact associated with the three systems. The risk and performance factors as well as the resulting relative risk and performance impacts are presented in Appendix E.

There are a number of ways of using the information in Appendix E to evaluate the relative merit of transferring one or more of the three systems. The actual evaluation is an AFLC responsibility. The following illustrative analyses are presented only to indicate how the data may be used. In the first illustration, no weighting of absolute risk or absolute performance impact is applied. That is, the information contained in the bottom row of Figures E-2 through E-6 is not used.

In this example, the risk factors are uniformly weighted as indicated in Figure 1. The relative risk scores for each system for each risk factor are multiplied by the weight for each risk factor and summed across the factors to yield a total relative risk score.

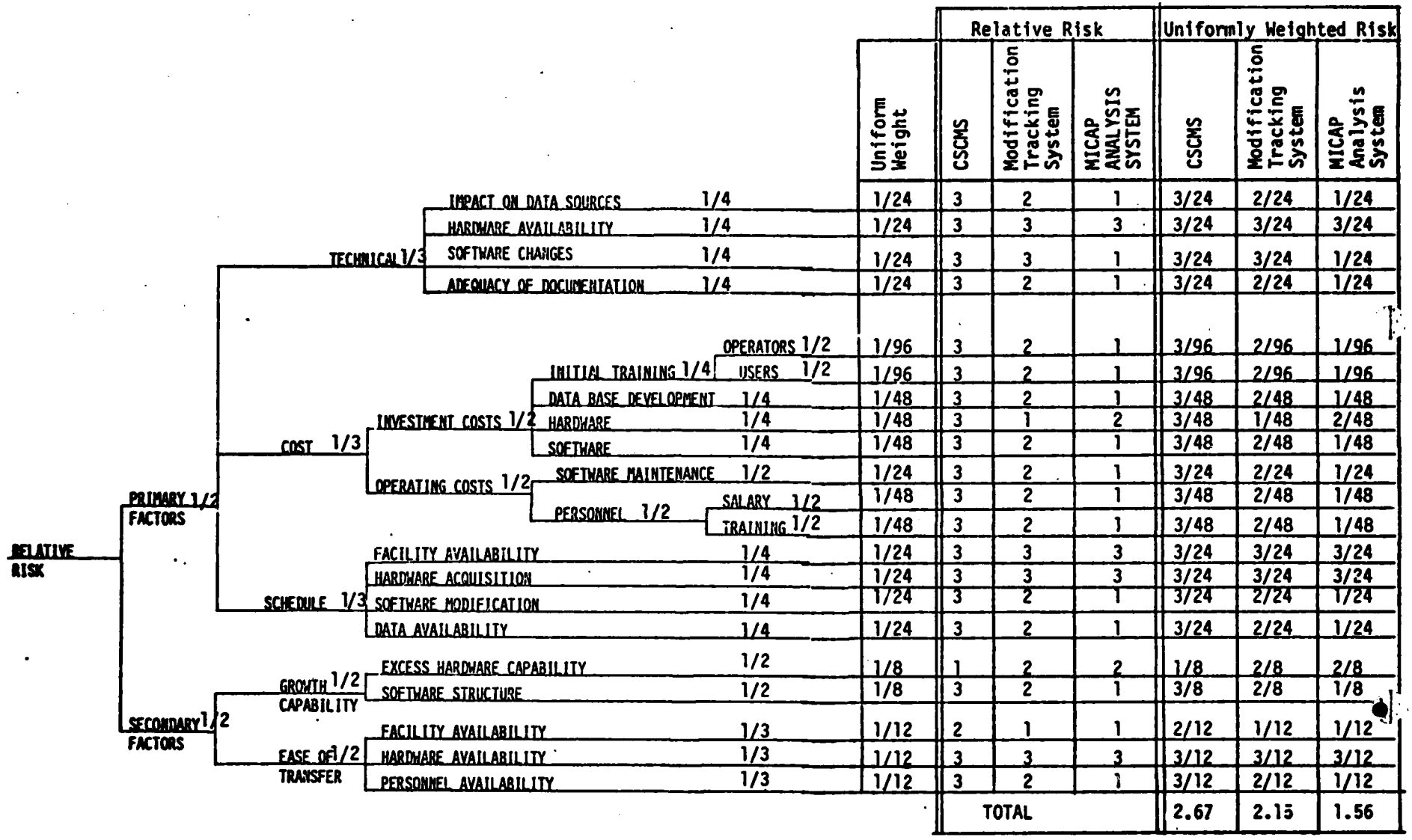
Similarly, in Figure 2, the performance impact factors are uniformly weighted and the relative performance score for each system for each performance factor is multiplied by the appropriate weight. The uniformly weighted scores are then summed across the performance factors to yield a total relative performance impact score for each system.

Relative performance impact is plotted against relative risk for each system in Figure 3. It is seen that the MICAP Analysis System would have the least risk while the Modification Tracking system would have the greatest performance impact. The CSCMS has the highest risk and the same performance impact as the MICAP analysis system.

If Relative System Merit is defined as:

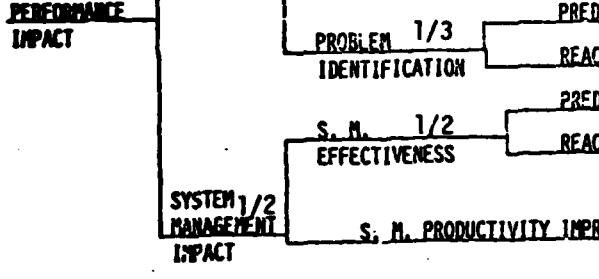
Relative System Merit = Performance Impact x Risk

the scores are as follows:



	Uniform Weight	Relative Risk: CSCMS	Relative Risk: Modification Tracking System	Relative Risk: MICAP ANALYSIS SYSTEM	Uniformly Weighted Risk: CSCMS	Uniformly Weighted Risk: Modification Tracking System	Uniformly Weighted Risk: MICAP Analysis System
IMPACT ON DATA SOURCES 1/4	1/24	3	2	1	3/24	2/24	1/24
HARDWARE AVAILABILITY 1/4	1/24	3	3	3	3/24	3/24	3/24
SOFTWARE CHANGES 1/4	1/24	3	3	1	3/24	3/24	1/24
ADEQUACY OF DOCUMENTATION 1/4	1/24	3	2	1	3/24	2/24	1/24
OPERATORS 1/2	1/96	3	2	1	3/96	2/96	1/96
INITIAL TRAINING 1/4 USERS 1/2	1/96	3	2	1	3/96	2/96	1/96
DATA BASE DEVELOPMENT 1/4	1/48	3	2	1	3/48	2/48	1/48
INVESTMENT COSTS 1/2 HARDWARE 1/4	1/48	3	1	2	3/48	1/48	2/48
SOFTWARE 1/4	1/48	3	2	1	3/48	2/48	1/48
SOFTWARE MAINTENANCE 1/2	1/24	3	2	1	3/24	2/24	1/24
OPERATING COSTS 1/2 SALARY 1/2	1/48	3	2	1	3/48	2/48	1/48
PERSONNEL 1/2 TRAINING 1/2	1/48	3	2	1	3/48	2/48	1/48
FACILITY AVAILABILITY 1/4	1/24	3	3	3	3/24	3/24	3/24
HARDWARE ACQUISITION 1/4	1/24	3	3	3	3/24	3/24	3/24
SOFTWARE MODIFICATION 1/4	1/24	3	2	1	3/24	2/24	1/24
DATA AVAILABILITY 1/4	1/24	3	2	1	3/24	2/24	1/24
EXCESS HARDWARE CAPABILITY 1/2	1/8	1	2	2	1/8	2/8	2/8
SOFTWARE STRUCTURE 1/2	1/8	3	2	1	3/8	2/8	1/8
FACILITY AVAILABILITY 1/3	1/12	2	1	1	2/12	1/12	1/12
HARDWARE AVAILABILITY 1/3	1/12	3	3	3	3/12	3/12	3/12
PERSONNEL AVAILABILITY 1/3	1/12	3	2	1	3/12	2/12	1/12
TOTAL					2.67	2.15	1.56

FIGURE 1. EVALUATION OF SYSTEMS' RELATIVE RISK UNDER UNIFORM WEIGHTING



	Uniform Weight	Relative Risk			Uniformly Weighted Risk		
		CSCMS	Modification Tracking System	MICAP ANALYSIS SYSTEM	CSCMS	Modification Tracking System	MICAP Analysis System
W. S. DOWNTIME — SCHEDULED	1/12	N/A	1	N/A	N/A	1/12	N/A
W. S. DOWNTIME — UNSCHEDULED	1/12	1	3	2	1/12	3/12	2/12
CONTINGENCY RESPONSIVENESS	1/6	1	2	2	1/6	2/6	2/6
PROBLEM IDENTIFICATION — PREDICTIVE	1/12	1	2	3	1/12	2/12	3/12
PROBLEM IDENTIFICATION — REACTIVE	1/12	3	2	1	3/12	2/12	1/12
S. M. EFFECTIVENESS — PREDICTIVE	1/8	1	2	3	1/8	2/8	3/8
S. M. EFFECTIVENESS — REACTIVE	1/8	3	2	1	3/8	2/8	1/8
S. M. PRODUCTIVITY IMPROVEMENT	1/4	3	1	2	3/4	1/4	2/4
			TOTAL		2.00*	1.75	2.00*

*Score Normalized by Raw Source x $\frac{12}{11}$ to account for N/A score on top line.

FIGURE 2. EVALUATION OF SYSTEMS' RELATIVE PERFORMANCE IMPACT UNDER UNIFORM WEIGHTING

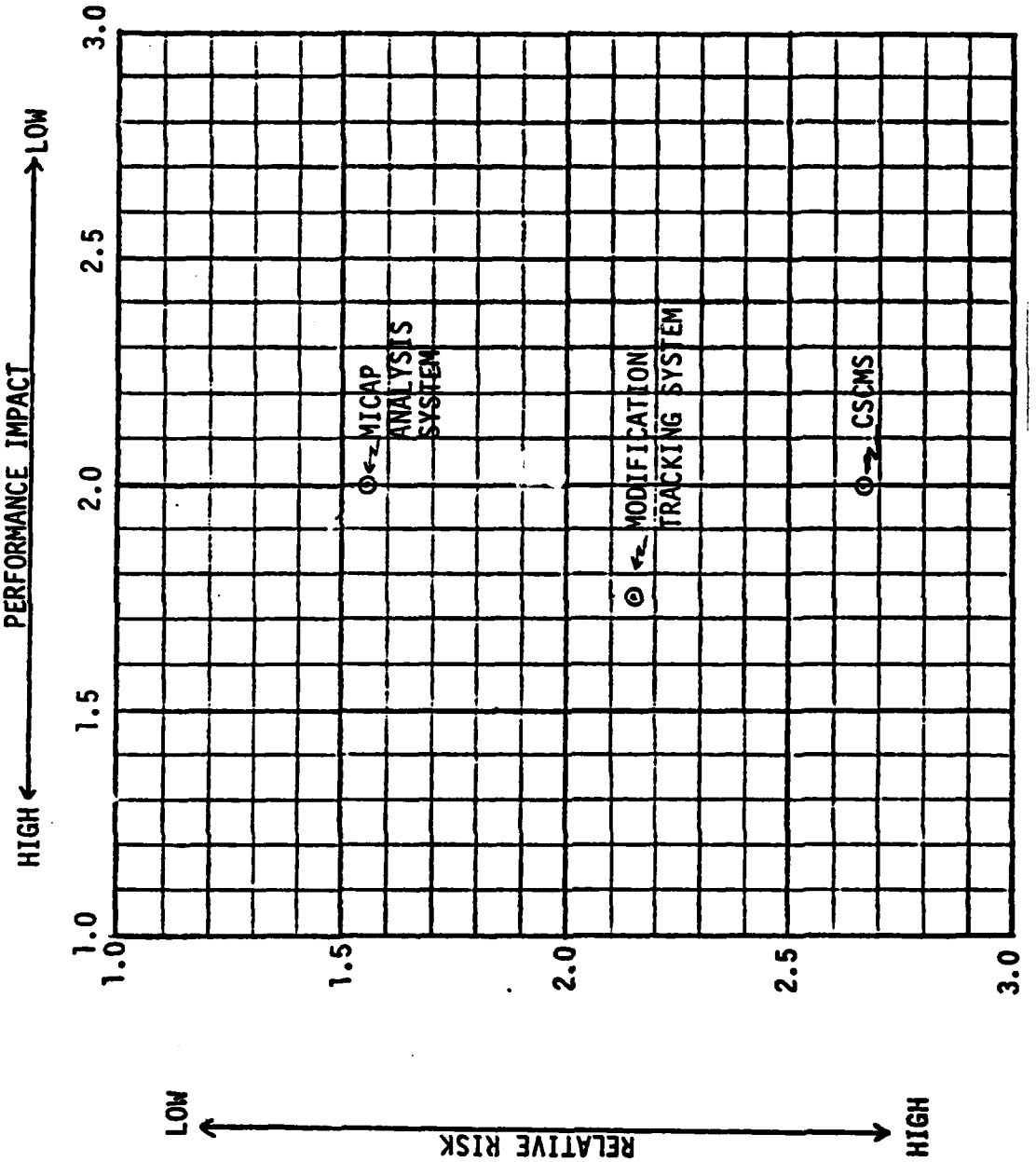


FIGURE 3. PERFORMANCE IMPACT VERSUS RELATIVE RISK UNDER UNIFORM WEIGHTING

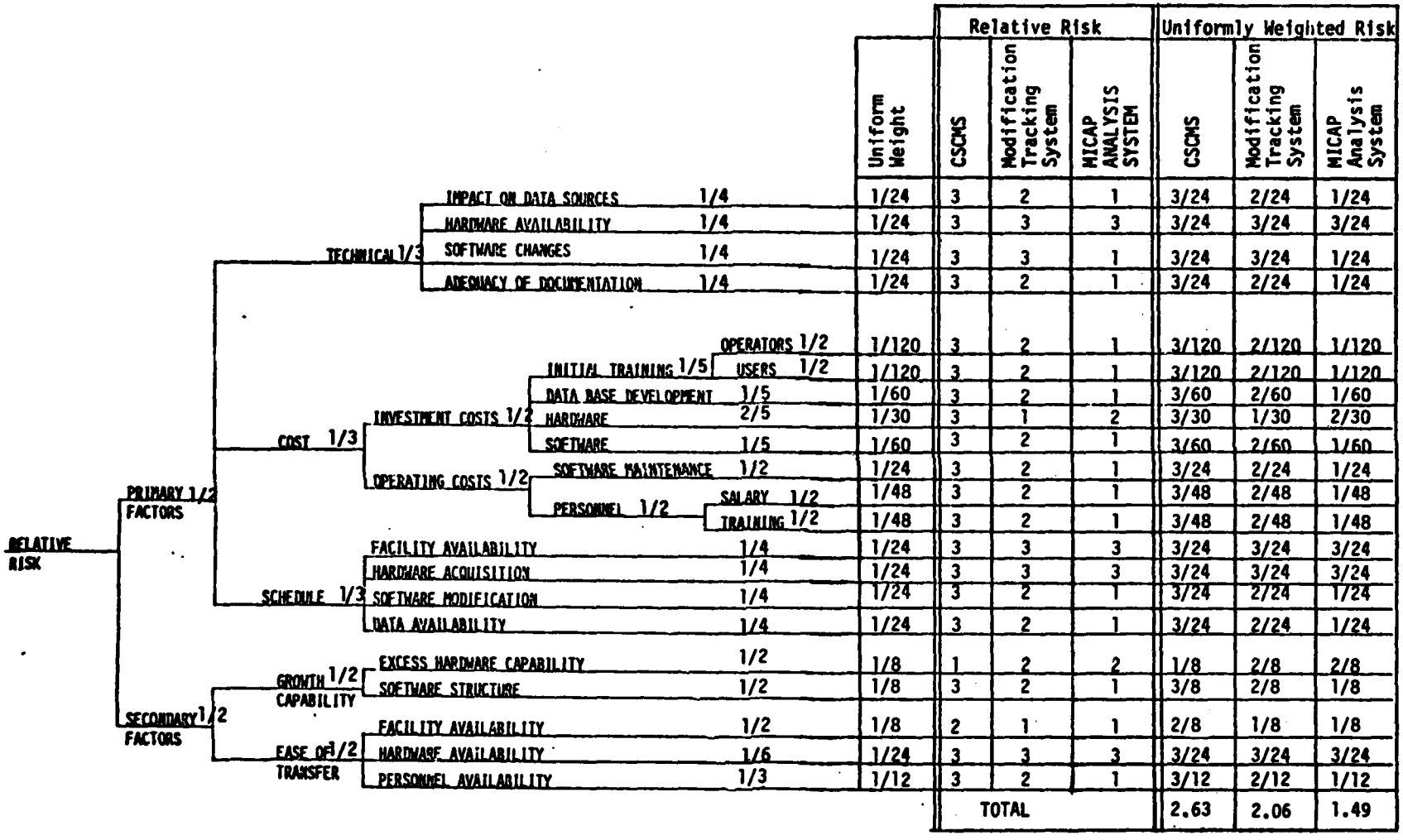
System	System Merit Score
CSCMS	5.34
Modification Tracking	3.76
MICAP Analysis	3.12

Low System Merit scores are preferred to high scores under the scoring system used.

A non-uniform weighting scheme that takes into account the absolute risk and absolute performance impact shown in the bottom rows of the matrices in Figures B-2 through B-6 is analyzed in Figures 4 and 5. The non-uniform weighting shows up in Figure 4 in the Investment Cost Factors and Ease of Transfer factors, and in Figure 5 in the SM effectiveness factors. The non-uniformly weighted results are plotted in Figure 6 along with the weighted result. The effect of the weighting is to slightly decrease the relative risk associated with all three systems. The performance impact of the MICAP Analysis System is slightly improved. The Modification Tracking System's performance remains unchanged and the CSCMS has slightly decreased performance impact.

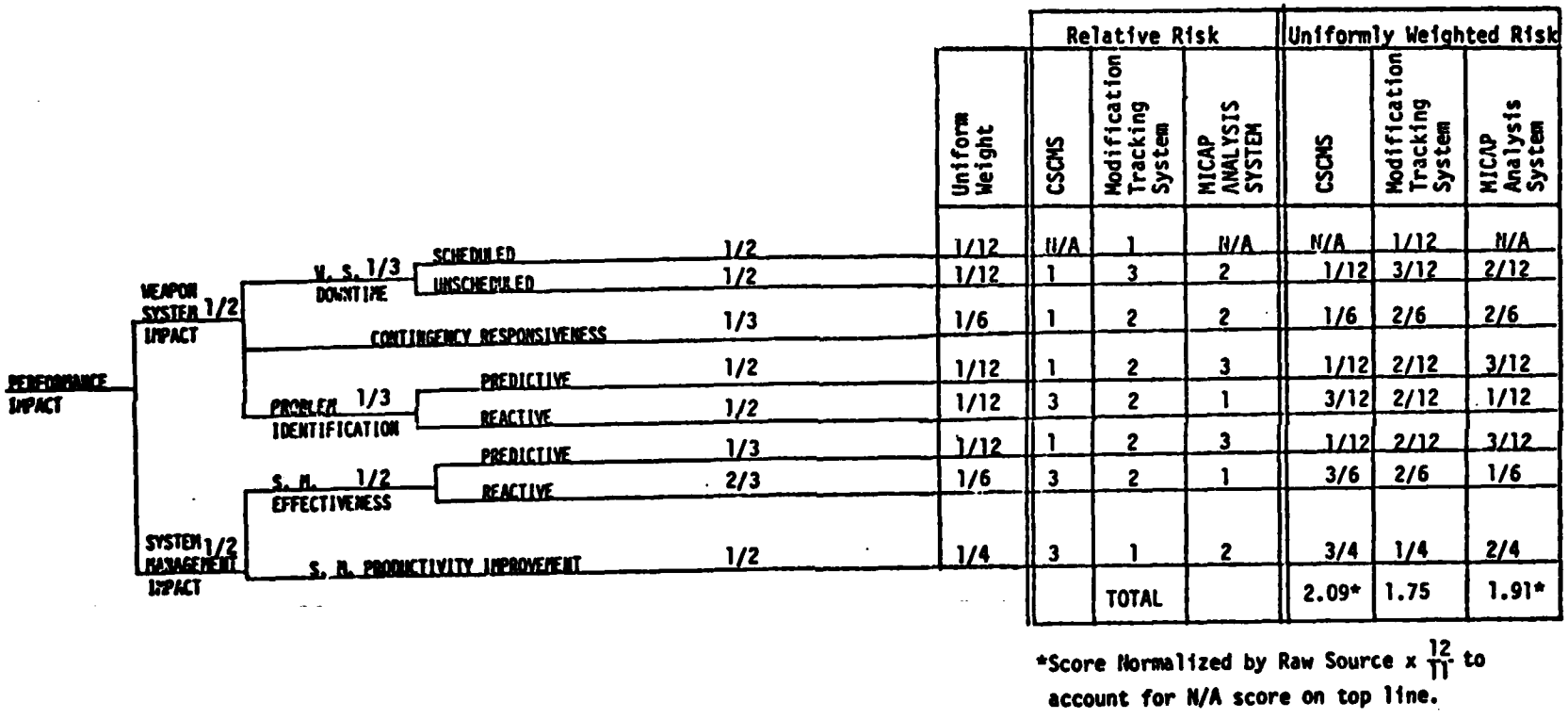
A third illustration of how the information may be used is illustrated in Figure 7. In this example hardware and facility considerations are eliminated from the Relative Risk analysis. This analysis holds independent of whether the absolute risk information contained in the bottom rows of the matrices in Figure E-2 through E-5 are considered. This result derives from the fact that the non-uniform absolute risk weighting resulted only from the hardware and facility factors which were eliminated.

The effect, shown in Figures 8 and 9 clearly separates the risk associated with the three systems under uniform or non-uniform weighting while leaving the performance impact unchanged. Hardware and facilities do not appear among the Performance Impact factors so Figures 2 and 5 would remain unchanged for this illustration.



	Uniform Weight	Relative Risk: CSCMS	Relative Risk: Modification Tracking System	Relative Risk: MICAP ANALYSIS SYSTEM	Uniformly Weighted Risk: CSCMS	Uniformly Weighted Risk: Modification Tracking System	Uniformly Weighted Risk: MICAP Analysis System
IMPACT ON DATA SOURCES 1/4	1/24	3	2	1	3/24	2/24	1/24
HARDWARE AVAILABILITY 1/4	1/24	3	3	3	3/24	3/24	3/24
SOFTWARE CHANGES 1/4	1/24	3	3	1	3/24	3/24	1/24
ADEQUACY OF DOCUMENTATION 1/4	1/24	3	2	1	3/24	2/24	1/24
OPERATORS 1/2	1/120	3	2	1	3/120	2/120	1/120
INITIAL TRAINING 1/5 USERS 1/2	1/120	3	2	1	3/120	2/120	1/120
DATA BASE DEVELOPMENT 1/5	1/60	3	2	1	3/60	2/60	1/60
INVESTMENT COSTS 1/2 HARDWARE 2/5	1/30	3	1	2	3/30	1/30	2/30
SOFTWARE 1/5	1/60	3	2	1	3/60	2/60	1/60
SOFTWARE MAINTENANCE 1/2	1/24	3	2	1	3/24	2/24	1/24
OPERATING COSTS 1/2 PERSONNEL 1/2 SALARY 1/2	1/48	3	2	1	3/48	2/48	1/48
PERSONNEL 1/2 TRAINING 1/2	1/48	3	2	1	3/48	2/48	1/48
FACILITY AVAILABILITY 1/4	1/24	3	3	3	3/24	3/24	3/24
HARDWARE ACQUISITION 1/4	1/24	3	3	3	3/24	3/24	3/24
SOFTWARE MODIFICATION 1/4	1/24	3	2	1	3/24	2/24	1/24
DATA AVAILABILITY 1/4	1/24	3	2	1	3/24	2/24	1/24
EXCESS HARDWARE CAPABILITY 1/2	1/8	1	2	2	1/8	2/8	2/8
SOFTWARE STRUCTURE 1/2	1/8	3	2	1	3/8	2/8	1/8
FACILITY AVAILABILITY 1/2	1/8	2	1	1	2/8	1/8	1/8
HARDWARE AVAILABILITY 1/6	1/24	3	3	3	3/24	3/24	3/24
PERSONNEL AVAILABILITY 1/3	1/12	3	2	1	3/12	2/12	1/12
TOTAL					2.63	2.06	1.49

FIGURE 4. EVALUATION OF SYSTEMS' RELATIVE RISK
(NON-UNIFORM WEIGHTING)



	Uniform Weight	Relative Risk: CSCMS	Relative Risk: Modification Tracking System	Relative Risk: MICAP ANALYSIS SYSTEM	Uniformly Weighted Risk: CSCMS	Uniformly Weighted Risk: Modification Tracking System	Uniformly Weighted Risk: MICAP Analysis System
	1/12	N/A	1	N/A	N/A	1/12	N/A
	1/12	1	3	2	1/12	3/12	2/12
	1/6	1	2	2	1/6	2/6	2/6
	1/12	1	2	3	1/12	2/12	3/12
	1/12	3	2	1	3/12	2/12	1/12
	1/12	1	2	3	1/12	2/12	3/12
	1/6	3	2	1	3/6	2/6	1/6
	1/4	3	1	2	3/4	1/4	2/4
			TOTAL		2.09*	1.75	1.91*

*Score Normalized by Raw Source x $\frac{12}{11}$ to account for N/A score on top line.

FIGURE 5. EVALUATION OF SYSTEMS' RELATIVE PERFORMANCE IMPACT (NON-UNIFORM WEIGHTING)

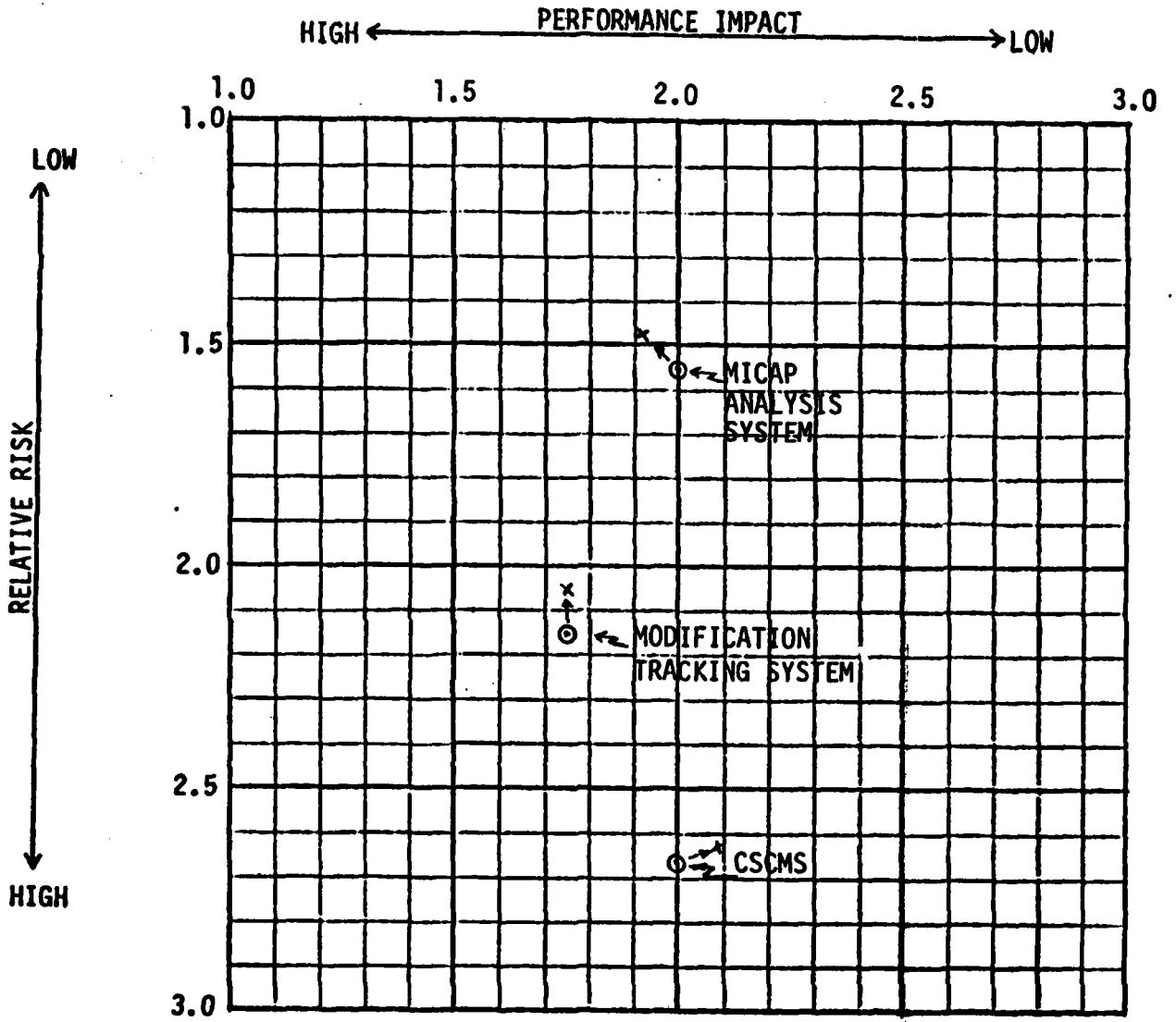
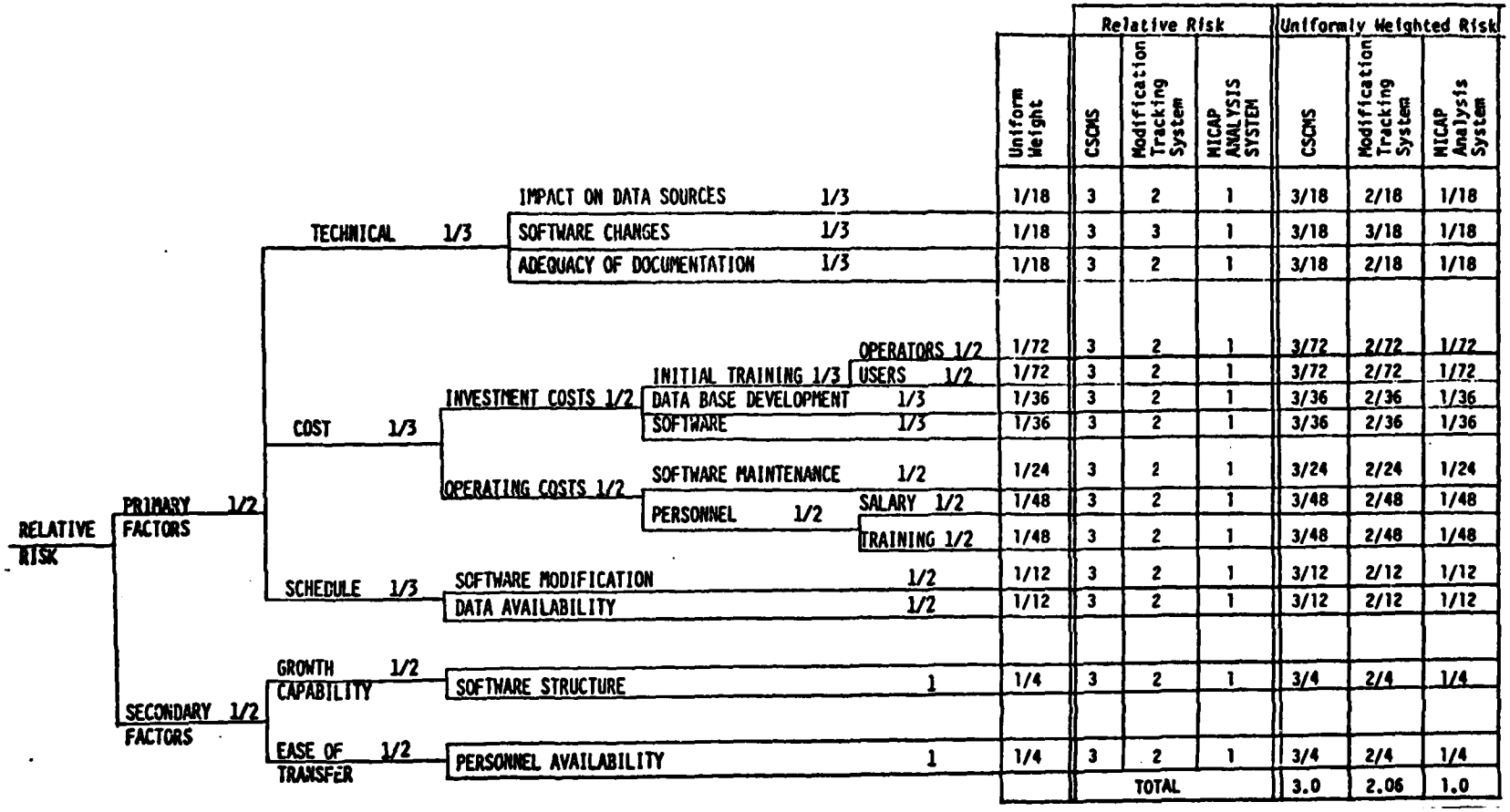


FIGURE 6. PERFORMANCE IMPACT VERSUS RELATIVE RISK (NON-UNIFORM WEIGHTING)



	Uniform Weight	Relative Risk			Uniformly Weighted Risk		
		CSCMS	Modification Tracking System	MICAP ANALYSIS SYSTEM	CSCMS	Modification Tracking System	MICAP Analysis System
IMPACT ON DATA SOURCES 1/3	1/18	3	2	1	3/18	2/18	1/18
SOFTWARE CHANGES 1/3	1/18	3	3	1	3/18	3/18	1/18
ADEQUACY OF DOCUMENTATION 1/3	1/18	3	2	1	3/18	2/18	1/18
OPERATORS 1/2	1/72	3	2	1	3/72	2/72	1/72
INITIAL TRAINING 1/3 USERS 1/2	1/72	3	2	1	3/72	2/72	1/72
INVESTMENT COSTS 1/2 DATA BASE DEVELOPMENT 1/3	1/36	3	2	1	3/36	2/36	1/36
SOFTWARE 1/3	1/36	3	2	1	3/36	2/36	1/36
SOFTWARE MAINTENANCE 1/2	1/24	3	2	1	3/24	2/24	1/24
OPERATING COSTS 1/2 PERSONNEL 1/2 SALARY 1/2	1/48	3	2	1	3/48	2/48	1/48
TRAINING 1/2	1/48	3	2	1	3/48	2/48	1/48
SOFTWARE MODIFICATION 1/2	1/12	3	2	1	3/12	2/12	1/12
DATA AVAILABILITY 1/2	1/12	3	2	1	3/12	2/12	1/12
SOFTWARE STRUCTURE 1	1/4	3	2	1	3/4	2/4	1/4
PERSONNEL AVAILABILITY 1	1/4	3	2	1	3/4	2/4	1/4
		TOTAL			3.0	2.06	1.0

FIGURE 7. EVALUATION OF SYSTEMS' RELATIVE RISK WITH NO HARDWARE OR FACILITY CONSIDERATIONS

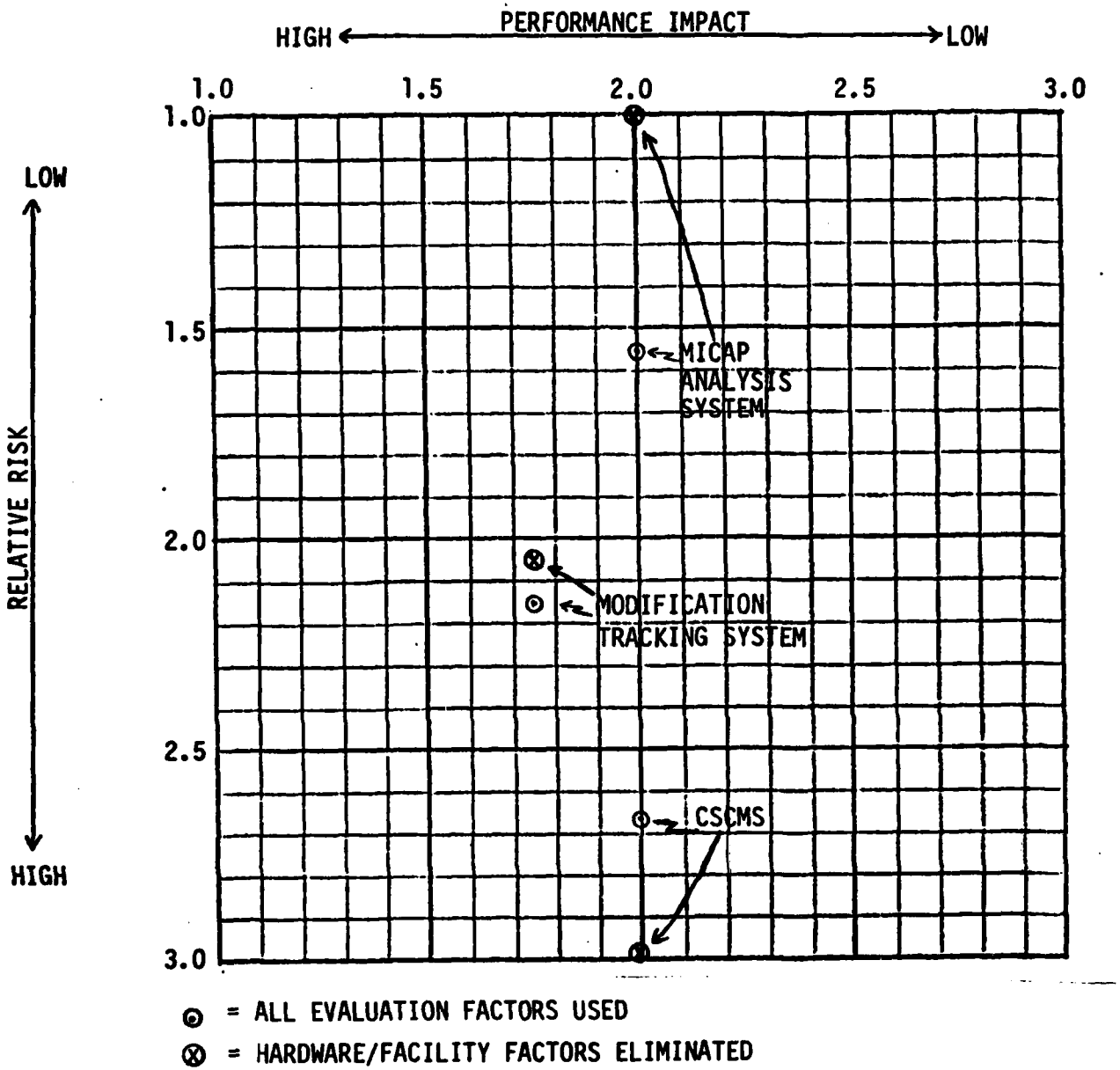


FIGURE 8. PERFORMANCE IMPACT VERSUS RELATIVE RISK (UNIFORM WEIGHTING WITH AND WITHOUT HARDWARE/FACILITY CONSIDERATIONS)

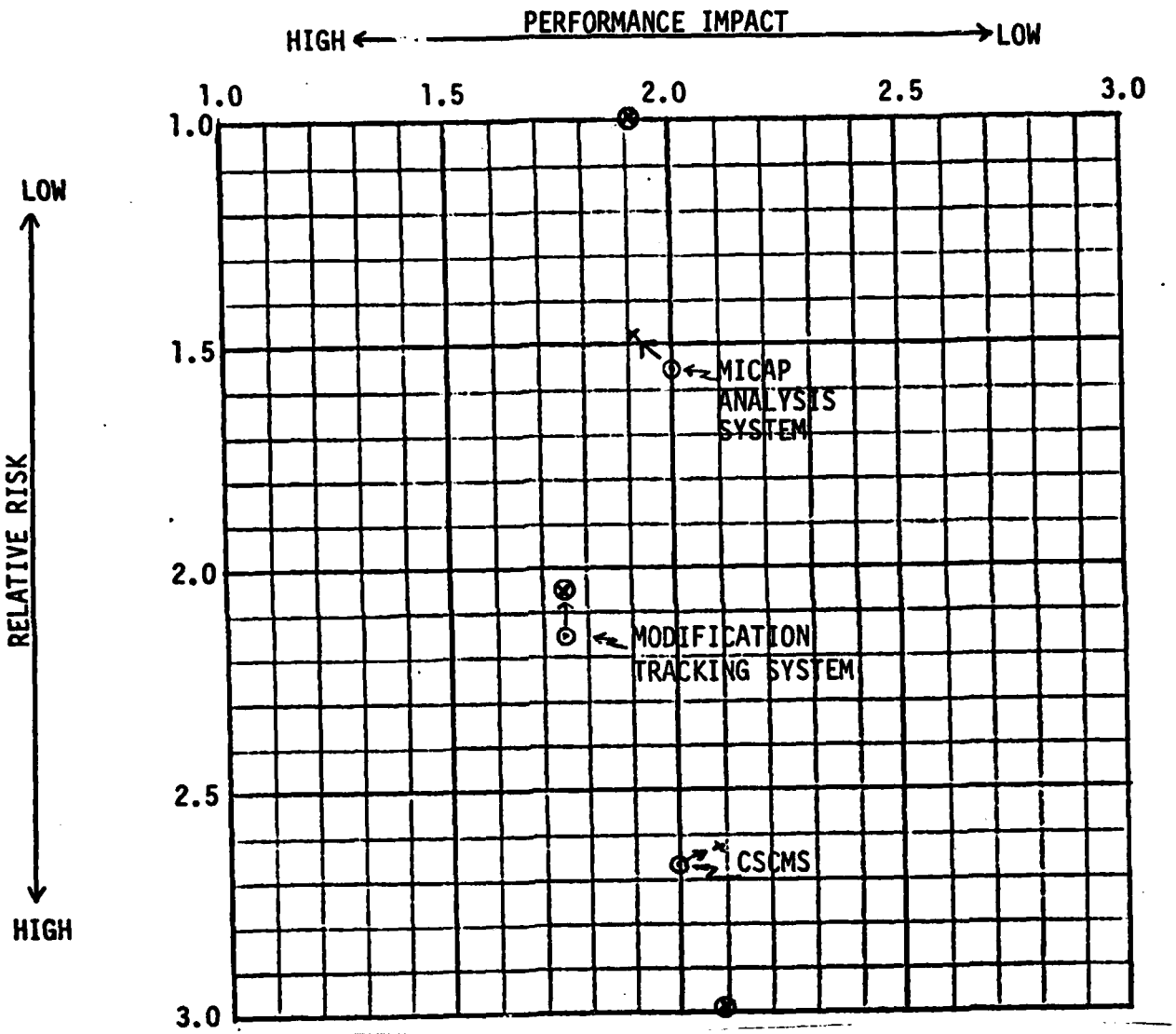


FIGURE 9. PERFORMANCE IMPACT VERSUS RELATIVE RISK (NON-UNIFORM WEIGHTING WITH AND WITHOUT HARDWARE/FACILITY CONSIDERATIONS)

The relative system merit for the three examples is summarized as follows:

SYSTEM MERIT SCORE

	All Factors Considered		Hardware and Facility Factors Eliminated	
	Uniform Weighting	Non-Uniform Weighting	Uniform Weighting	Non-Uniform Weighting
CSCMS	5.34	5.50	6.00	6.27
Modification Tracking	3.76	3.60	3.60	3.60
MICAP Analysis	3.12	2.85	2.00	1.91

Again, low Merit Scores are preferred to high scores.

A fourth illustrative analysis based on the ALC session participants' preferences given in Table E-7 indicates that:

1. If only one system were to be transferred "as is", the Modification Tracking and MICAP Analysis Systems would be equally preferred over the CSCMS
2. If only one system were to be transferred and each ALC was allowed to tailor the system to its peculiar requirements, the Modification Tracking System would be preferred over the MICAP and CSCMS systems
3. If two systems were to be transferred, the Modification Tracking and MICAP Analysis systems would be chosen with the Modification Tracking and CSCMS combination being preferred as a close second choice. These choices would hold independent of whether the systems were transferred "as is" or whether modifications were permitted.

It must be remembered, however, that these choices were related to the cross section of weapon systems and areas of expertise represented by the attendees. They should not be construed as representing the official, or even necessarily a representative, position of the ALCs.

OBSERVATIONS/RECOMMENDATIONS

The following observations and recommendations derived from Battelle's efforts to facilitate the evaluation which was designed to identify the relative merits of transferring one or more of the CSCMS, Modification Tracking, and MICAP Analysis Systems from the Ogden Readiness Control Center to the other ALCs. Battelle's role was not to evaluate the systems per se, but rather to provide methodology for identifying the preferences of AFLC personnel from the ALCs and for providing the methodology to analyze those preferences.

In performing our role, certain information was obtained and impressions were formed that are believed to be worth documenting as observations. These are noted below followed by the basic recommendation.

The observations, in unranked order, are as follows:

- There is little doubt that the ALCs could productively use the Modification Tracking and MICAP Analysis Systems. They would, of course, have to be tailored to the weapon systems assigned to the various ALCs to enhance their usefulness in their own work environment.
- Ready access to computer facilities is critical to successful transfer.
- Analytical capability in MM at the ALCs is uneven across ALCs. Adequate support is essential to benefit from the use of these or any other tools developed for the System Manager.
- System development at the ALCs is stifled by lack of computational capability that is accessible to analysts for experimental development.
- The CSCMS model needs further development to handle (a) multiple systems and address the "common item" problem, and (b) non-tactical weapon systems.
- The CSCMS model will require dedicated analytical support to use properly (i.e., to understand underlying assumptions implicit in the model and to generate valid results).
- The CSCMS model results need to be verified/validated.
- The CSCMS model is a desirable command capability that should be centrally supported (at HQ AFLC?) but accessible throughout the command.
- Further dialogue should be established among the SMs at the various ALCs so that cross-fertilization of developing management system capabilities can continue to take place at regular intervals.

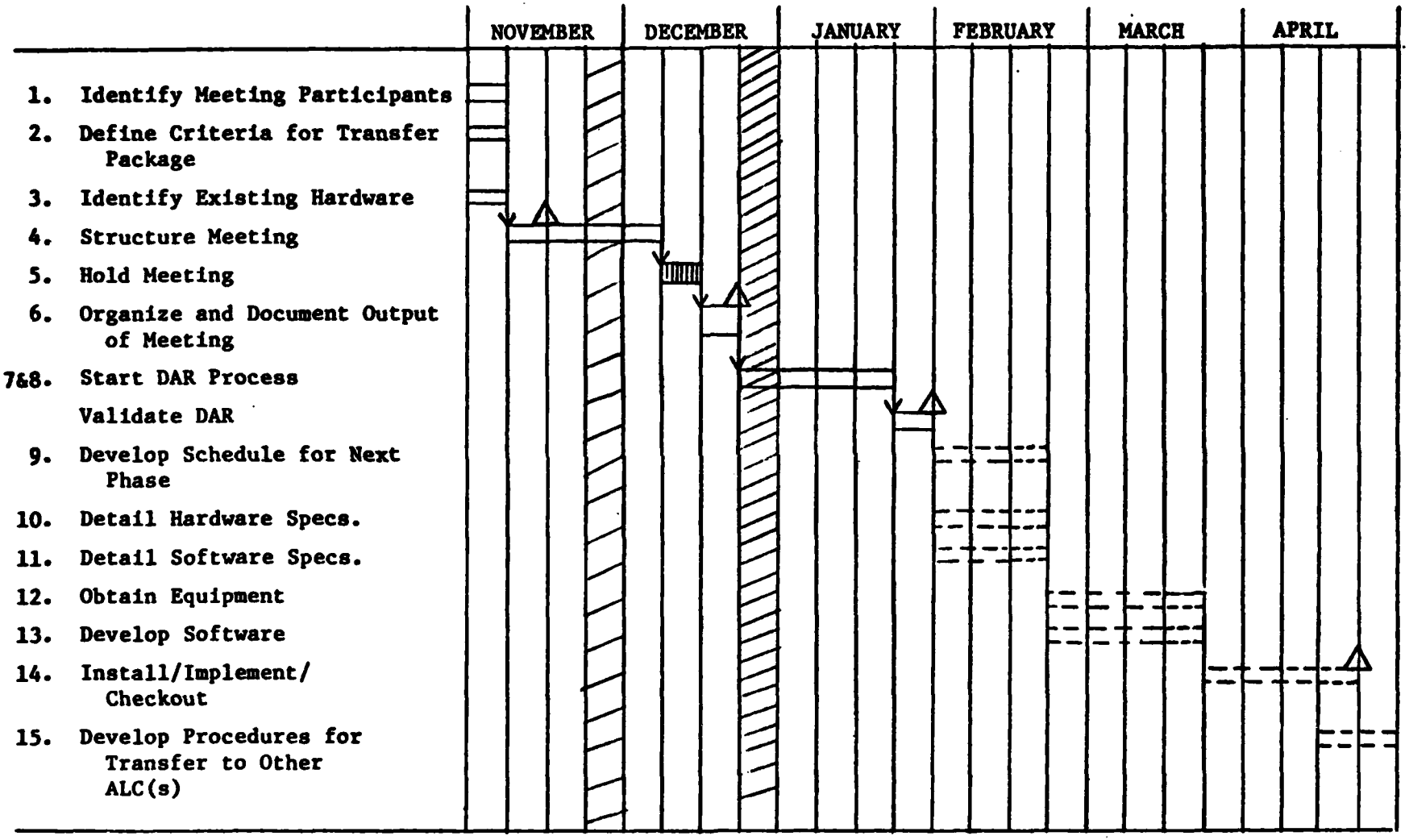
Finally, the basic recommendations are:

- LO/XR analyze/weigh the session results presented in this report to determine the system(s) appropriate for transfer.
- LM should determine the most effective way to implement each of the three systems at each of the ALCs other than Ogden ALC. This determination should inlcude consideration of existing computer availability as well as new purchase.

APPENDIX A

RCC EVALUATION SCHEDULE

SCHEDULE OF TRANSFER OF RCC CAPABILITY



APPENDIX B

MEETING STRUCTURE AND PARTICIPANTS

AGENDA FOR MEETING

13-15 January 1981

AT OO-ALC

DAY 1

Welcome - OGDEN	0800-0810
Opening Remarks - AFLC/LO	0810-0815
Purpose of the Meeting - AFLC/LO	0815-0830
RCC Overview - OGDEN	0830-0930
BREAK	0930-0940
LMS Planning Project - AFLC/XR	0940-0955
Evaluation Process - BATTELLE	1000-1030
Wartime Capability Assessment Technique - OGDEN	1030-1130
LUNCH	1130-1300
PACAF Combat Support and Capability Management System Presentation - OGDEN	1300-1400
Evaluation/Discussion - BATTELLE	1400-1630

DAY 2

MOD Tracking System Presentation - OGDEN	0800-0900
Evaluation/Discussion - BATTELLE	0900-1130
LUNCH	1130-1300
MICAP Analysis System Presentation - OGDEN	1300-1400
Evaluation/Discussion - BATTELLE	1400-1630

DAY 3

Application of Score Sheets and Prioritization - BATTELLE	0800-1145
Closing Remarks - AFLC/LO	1145-1200

LIST OF ATTENDEES
FOR
READINESS CONTROL CENTER (RCC) CAPABILITY PLANNING MEETING

ATTENDEES	GRADE	ORG
Barbara Arnold	GS-13	HQ AFLC/LO
Fred Healae	LtCol	HQ AFLC/LO
Duane Tucker	GS-13	HQ AFLC/XR
Bob Galloway	GS-13	SA-ALC/MMSS
Charles Jurek	GS-13	SA-ALC/MMMR
Robin Ragen	GS-12	OC-ALC/MMM
Jim Bias	GS-13	OC-ALC/MME
Howard Wright	GS-13	WR-ALC/MMS
Al McQuary	GS-14	SM-ALC/MMS
Carl Distefano	GS-12	SM-ALC/MMM
Doug Hill	Contractor	Battelle
Kay Miller	Contractor	Battelle
Mike Kluse	Contractor	Battelle
Don Hines	GS-11	OO-ALC/MMS
Gene Jones	GS-12	OO-ALC/MMS
Don Naef	GS-12	OO-ALC/MMS
Mike Williams	GS-12	OO-ALC/XR
Bob Tripp	Major	OO-ALC/MMM
Vern Thom	Major	OO-ALC/MMM
Perry Koch	Major	OO-ALC/MMM
Ken Hales	GS-05	OO-ALC/MMM
Garry Peery	GS-12	OO-ALC/ACD
Terry Fernelius	GS-11	OO-ALC/ACD
Susan Bosler	GS-09	OO-ALC/ACD
Woody Bryant	LtCol	OO-ALC/MMA

APPENDIX C

OPERATIONAL IMPACT OF SYSTEMS EVALUATED

RCC SYSTEM EVALUATION
OPERATIONAL IMPACT

INFORMATION CATEGORY	CSMCS MODEL (A)	MODIFICATION TRACKING SYSTEM (B)	MICAP ANALYSIS SYSTEM (C)
Data Structure	Need D104 authorization levels Uses item essentiality codes Need LRS/SRU relationships from WUC Source is ILDF or D029 Source of LRU/SRU may be different based on life of weapon system, i.e., MMA vs. MMS May need DG41 and D029 depending on range of items selected WRSK conference is starting point for item selection Need war plans and resources Only deals with recoverable spares--about 750 items currently selected Problems with "squeezed" D041 tapes	G026/G079 should provide data but are not up to date Don't want to feed two systems same data Need SM to tailor milestones to his system/modification Can be used to highlight need to maintain G026/G079 Also uses H057 data for financial tracking system	Off D-165B tapes (monthly) Can process daily tapes, but not that useful
Geographic Distribution of Data Entry and Users	Each MAJCOM maintains separate data base Need information from 1050 AFLC can't access that data now Each F-4 is different weapon platform	Most data located at same ALC	May be competition among users at same ALC--hardware limitations Some problems are actually command based, not supply
Criticality of Data	Could replace M1, 2, 3 system Collected every 30 days Must be credible to use with IM or no impact	Provide near-time but no real time visibility "As of" date is used for data, not report generation Does not track field performance to check actual progress Talk to engineers to get data manually Accuracy critical for FMS use	
Archival Considerations	Currently use most recent quarter only Need trend data to predict problems on top 20-25 NMCS Need to store only summary data, not raw input	Can use history by tail number for configuration control No trend data currently available Repeat milestone events should be retained--problem areas	Trend analysis is part of current business Need history of at least the top 20
Processing Requirements	Must understand assumptions such as 100% cannibalization Assumes consolidation of shortages Each base has same MORS rate Evaluates depth of WRSK, not range	Modification interrelationships are not shown (e.g., do this TCTO first) Uses standard events and times, but can be edited Shows slips Flexible calendar	Longest time requirement is to identify top 20 Lots of computational time, but not much complexity
Input/Output Volume	Problem in F-16 is not knowing what question to ask Require full understanding of system capability to analyze output Need support of upper staff wanting the model Required skilled manpower	Need person dedicated to input data --all engineers can't operate and understand Will give ammunition to require G026/79 update Consumes much time for initial load/modification	Could save manpower in preparation of charts and in data search Takes 3 hours to load data, 4 hours to run monthly requirements
Output Requirements/ Response Times	Best used for "what if" requests--will probably increase if capability available Probably generate every 30 days on regular basis Should improve quality of "what if" responses Utility in dealing with SM depends on credibility of model	LOG officer probably closer to MOD schedule than modification manager System will benefit F-15/C-130 Review selected modifications with branch chief 2X/month Review all about once/quarter	High use system Represents information on a major rating area Generates 13 different report types

RCC SYSTEM EVALUATION
OPERATIONAL IMPACT

INFORMATION CATEGORY	CSMCS MODEL (A)	MODIFICATION TRACKING SYSTEM (B)	MICAP ANALYSIS SYSTEM (C)
Needed Interface with Other Systems and Volume of Data to be Passed	D029 has all elements you need D104, D041 may be better sources Need 1050 interface Doesn't allow simultaneous analysis of scenarios or weapon systems to give accurate calculation of common item usage Need automatic extraction of data from other systems	G026/79 should be updated daily Don't need interface this frequently Should get total tape and extract data G079 is only adequate at semiannual review time	Interfaces with D165B Some would prefer interface with daily tapes
Man-Machine Interface	Needs analyst to interpret questions and transform into program input Needs analyst to do preliminary analysis of output Not available directly to SM	Need dedicated people for input Need to input and maintain is different than need to extract data	Needs to be usable by SM--not trained analysts Can be used to detect errors in D-165 input
Training Requirements	Can't afford training time Need good SM manual	Need system in SM area-simplified instructions Separate manuals for users and operators	SM doesn't need to know how to input, but simply how to extract
Availability of System	Need system in SM area, not in another building "What ifs" happen anytime--have to be able to respond	Need system in SM area, not centrally located	Need system in SM area Can do manually if system is down, but more time consuming, less accurate
Vulnerability Considerations	Want only my system--no input from other systems Must have standardization of core--with flexibility to adapt to specific SM needs For local control, use password	SM has to determine appropriate milestones for his modification	No problems seen
Security/Privacy Considerations	No classified data		Not applicable
System Development	Requires interaction of scenarios and weapon systems to provide accurate requirements for common items Reverse to compute sortie outputs, given resources Need to handle depot-level actions Phase 2--D041 tapes used Phase 3--D104 tapes from other ALCs Phase 4--Avionics Look for benefits from collocating stocks, reduced flying hours, reduced deployment locations TAC/PACAF are running on their own computers Not sure how to handle Forward Support Base		Some SMs want daily tape to use for tracking problems Need to see daily problems by base Would like to see % computation included Would like sources of supply identified Would like to be able to input current status of problem

APPENDIX D

TECHNICAL VIEWPOINT ON SYSTEMS EVALUATED

RCC SYSTEM EVALUATION
TECHNICAL VIEWPOINT

INFORMATION CATEGORY	CSMCS MODEL (A)	MODIFICATION TRACKING SYSTEM (B)	MICAP ANALYSIS SYSTEM (C)
Data Structure	Data is available for tactical systems, but may not exist or may be difficult to obtain for a MAC/SAC system Data requires 12M bytes of on-line disc space Tape inputs - D029 - Minimum backorder analysis techniques system data file - Operational tracking and control subsystem data file Card input - Combined base and CIRF stock - Base stock - CIRF stock User responses	Requires AFLC Forms 192D and 48 for for each modification All data is input manually via terminal Data is available at all ALCs Built-in audit trail capability Data base protected against schedule changes Data base is a PDP-11/70 index sequential disc file	Data consists of D165B tape and user responses to program prompts Data available at all ALCs Data base is composed of PDP-11/70 sequential and index sequential disc files Data base requires 17M bytes of on-line disc space
Geographic Distribution of Data Entry and Users	Each ALC would prefer own model rather than tie-in to Ogden DEC 10 Ogden is people-limited to support other ALCs on its DEC 10 Currently no communication links into Ogden DEC 10 since it is located in a secure area ALCs prefer HQ/XRS maintain configuration management rather than AF Design Center	Data entry at the ALC managing the modification Possible requirement for data at HQ if they want reports Very little resource data--ALCs would like resource data included	Users/data all local to each ALC Need exists for terminals at each ALC
Criticality of Data	Data is always not current nor perfect D041 data is always changing Assumptions in model are very important and must be understood	System allows one day to fix errors --after one day, entries are regarded as actions and are tracked by the system System provides some logical/consistency checks Local permanent file maintenance required	Depends on other systems being streamlined Other system status may preclude usage System may fade away during war
Archival Considerations	Ogden performs routine permanent file maintenance to back up disc files Local permanent file maintenance would be required at each ALC	Ogden performs routine permanent file maintenance to back up disc files Local permanent file maintenance would be required at each ALC	Ogden performs routine permanent file maintenance to back up disc files Local permanent file maintenance would be required at each ALC
Processing Requirements	Preprocessor on PDP-11/70 Model runs on DEC 10 Preprocessor programs are top-down structured ANSII standard COBOL programs Dynametrics model written in top-down RATFOR Rand runs model on VAX 11/780 Many problems/inconsistencies with data sources Preprocessor requires 64K bytes of memory Preprocessor composed of 29 COBOL programs No specialized data base management system	Runs on PDP-11/70 Approximately 20 programs in the system. One written in COBOL, remainder in FORTRAN IV PLUS Programs are modular but not structured Much character manipulation Plot 10 graphics package required to drive TEKTRONIX terminals Memory requirements currently unknown No specialized data base management system	Runs on PDP-11/70 System consists of 19 programs: - 4 FORTRAN - 1 COBOL - 14 BASIC plus 2 BASIC programs being rewritten in COBOL Requires 64K bytes of memory Plot 10 graphics package required to drive TEKTRONIX terminals No specialized data base management system
Input/Output Volume	All inputs on "as required" basis Preprocessor requires 4 runs on "as required" basis No operations support--user hangs own tapes and mounts own packs as needed Cards and tape input Output on "as required" basis	All input via terminal Weekly update of data base Initial data load requires approximately 8 hours per modification Update requires approximately 1 hour per week to update modifications	D165B--one reel per weapon system No special processing 13 runs on "as required" basis 1 monthly run 1 daily run 38 output options

RCC SYSTEM EVALUATION
TECHNICAL VIEWPOINT

INFORMATION CATEGORY	CSMCS MODEL (A)	MODIFICATION TRACKING SYSTEM (B)	MICAP ANALYSIS SYSTEM (C)
Output Requirements/ Response Times	No special processing required On-line and line printer output available No graphics output--standard writes to the terminal No special hardware required Output is preprocessor matrix	On-line and line printer output available TEKTRONIX terminal required for graphics SM should see data weekly--modification manager more often Color output requires TEKTRONIX 4027 color graphics terminal	All output via interactive terminal TEKTRONIX terminal required for graphics 38 output options
Needed Interface to Other Systems and Volume of Data to be Passed	Data from D029, minimum backorder analysis techniques system and operational tracking and control system contained on tape Base and CIRF stock contained on cards No automated interfaces	Currently no interfaces Plans to interface with H057, G026, and G079 H057, G026, and G079 need improvements to make them more current before interface is performed	Only interface is with D165B tape for the weapon system
Man-Machine Interface	Operations manual and maintenance manual available for preprocessor Only trivial documentation currently available for Dynametrics model Interactive portions are straightforward COBOL dictates AC involvement at ALCs if system exported No special hardware requirements User interfaces with tapes, cards, disc packs, and interactive terminals	Color output requires TEKTRONIX 4027 color graphics terminal Contractor documentation consists of user and programmer's manuals plus data layouts; documentation is very hard to follow and poorly written--inadequate at best User interfaces with AFLC Forms 192D and 48 and with interactive terminal COBOL dictates AC involvement at ALCs if system exported	User interfaces with D165B tape and interactive terminal Operators manual with minimal flowcharts available Interactive portions are straightforward COBOL dictates AC involvement at ALCs if system exported
Training Requirements	Full understanding of Dynametrics model would require several months of concentrated effort Model could be used after two weeks of study but with very limited understanding Requires involvement of operations research analyst in addition to a skilled programmer Contractor support available	Ogden currently supporting system with two programmers and having difficulty No contractor support Ogden has committed 6 to 10 man-weeks of effort to date, and estimates an additional 2 to 3 man-months required before full utility of system is realized	Miniminal training required for usage One day training required for full operation Terminal interrogations are very easy to understand
Availability of System	ALCs other than Ogden have no excess computing capacity available to to host the system Currently no capability to process classified data System downtime would not cause a major disruption in functioning of this work area	ALCs other than Ogden have no excess computing capacity available to host the system System downtime not critical for aircraft but more important for missiles due to higher priority Terminals not available at ALCs other than Ogden	ALCs other than Ogden have no excess computing capacity available to hose the system System downtime not critical Terminals not available at ALCs other than Ogden
Vulnerability Considerations	Permanent file maintenance and backup procedures required at all ALCs hosting system	Permanent file maintenance and backup procedures required at all ALCs hosting system Manual procedures always available for backup	Permanent file maintenance and backup procedures required at all ALCs hosting system D165B tapes always available
Security/Privacy Considerations	Scenarios may be classified--dictates encoding of data on a secure facility/computer; classified scenarios prohibit other ALCs from tie-in to Ogden	Not applicable--all data unclassified on modifications	Not applicable--all data unclassified
System Development	Make adaptations necessary to consider strategic as well as tactical systems Desirable to consider communications and electronics as well as weapon systems	Following future capabilities suggested: - Exception reporting - Tail number tracking - Better prompts - Closed loop with standard systems - Better user's manual - Applicability to communications and electronics modification management	BASIC plus 2 routines being rewritten in COBOL Local (Ogden) enhancements planned--files being reorganized to make run time faster

APPENDIX E

EVALUATION OF SYSTEM MERIT

EVALUATION OF SYSTEM MERIT

The relative merit of the three systems:

- o Combat Support Capability Management System (CSCMS)
- o Modification Tracking System, and
- o MICAP Analysis System

under consideration for transfer to ALC's, was evaluated along two major dimensions. These were:

Relative Risk, and

Performance Impact.

These major dimensions were further broken down into the component factors shown in Figures E-1 through E-6. Figures E-2 through E-5 were used by the session participants to score the relative risk associated with transferring each of the three systems under consideration.

The set of risk impact factors were selected to provide a reasonably comprehensive cross-section of the elements that might affect the ability of AFLC to successfully transfer the candidate systems from the Ogden Readiness Control Center to the other ALC's.

A three-point scoring system was used to evaluate relative risk with a score of 1 indicating the least risk and a score of 3 the greatest risk.

After filling in the relative risk in each matrix the participants were asked to evaluate the absolute risk (high, medium, or low) associated with the least risky system in each risk category. These evaluations are indicated in the bottom row of each matrix.

The performance factors shown in Figure E-6 were designed to facilitate the session participants judging the relative utility of the candidate systems insofar as their transfer would impact either weapon system performance or the system manager's performance.

Figure E-6 indicates the relative performance impact factors and scores associated with each system. Again a three-point scoring system was used. In this case a score of 1 indicates a higher impact on improved performance than a 2 or a 3.

RELATIVE RISK

SYSTEM	PRIMARY FACTORS			SECONDARY FACTORS	
	TECHNICAL	COST	SCHEDULE	GROWTH CAPABILITY	EASE OF TRANSFER
CSCMS					
MODIFICATION TRACKING SYSTEM					
MICAP ANALYSIS SYSTEM					

FIGURE E-1. OVERALL RISK EVALUATION FRAMEWORK

TECHNICAL RISK:

SYSTEM	IMPACT ON DATA SOURCES	HARDWARE AVAILABILITY	SOFTWARE CHANGES	ADEQUACY OF DOCUMENTATION
CSCMS	3	3	3	3
MODIFICATION TRACKING SYSTEM	2	3	3	2
MICAP ANALYSIS SYSTEM	1	3	1	1
ABSOLUTE RISK IMPACT FOR LOWEST SCORING SYSTEM	LOW	HIGH	LOW	LOW

FIGURE E-2. PRIMARY RISK FACTORS

COST RISK:

SYSTEM	INVESTMENT COSTS					OPERATING COSTS		
	INITIAL TRAINING		DATA BASE DEVELOPMENT	HARDWARE	SOFTWARE	SOFTWARE MAINTENANCE	PERSONNEL	
	OPERATORS	USERS					SALARY	TRAINING
CSCMS	3	3	3	3	3	3	3	3
MODIFICATION TRACKING SYSTEM	2	2	2	1	2	2	2	2
MICAP ANALYSIS SYSTEM	1	1	1	2	1	1	1	1
ABSOLUTE RISK IMPACT FOR LOWEST SCORING SYSTEM	LOW	LOW	LOW	MEDIUM	LOW	LOW	LOW	LOW

FIGURE E-3. PRIMARY RISK FACTORS (CONTINUED)

SCHEDULE RISK:

SYSTEM	HARDWARE ACQUISITION	SOFTWARE MODIFICATION	DATA AVAILABILITY	FACILITY AVAILABILITY
CSCMS	3	3	3	$3^{MM}/1^{AC}$
MODIFICATION TRACKING SYSTEM	3	2	2	$3^{MM}/1^{AC}$
MICAP ANALYSIS SYSTEM	3	1	1	$3^{MM}/1^{AC}$
ABSOLUTE RISK IMPACT FOR LOWEST SCORING SYSTEM	HIGH	LOW	LOW	HIGH FOR MM TO PROIVDE

FIGURE E-4. PRIMARY RISK FACTORS (CONTINUED)

SYSTEM	GROWTH CAPABILITY		EASE OF TRANSFER		
	EXCESS HARDWARE CAPACITY	SOFTWARE STRUCTURE	FACILITY AVAILABILITY	HARDWARE AVAILABILITY	PERSONNEL AVAILABILITY
CSCMS	$1^{(VAX)}$	3	2	3	3
MODIFICATION TRACKING SYSTEM	$1^{(VAX)}/2^{(11/70)}$	2	1	3	2
MICAP ANALYSIS SYSTEM	$1^{(VAX)}/2^{(11/70)}$	1	1	3	1
ABSOLUTE RISK IMPACT FOR LOWEST SCORING SYSTEM	LOW	LOW	HIGH	HIGH	MEDIUM

FIGURE E-5. SECONDARY RISK FACTORS

SYSTEM	WEAPON SYSTEM IMPACT					SYSTEM MANAGEMENT IMPACT		
	W. S. DOWNTIME		CONTINGENCY	PROBLEM IDENTIFICATION		S. M. EFFECTIVENESS		SM PRODUCTIVITY
	SCHEDULED	UNSCHEDULED	RESPONSIVENESS	PREDICTIVE	REACTIVE	PREDICTIVE	REACTIVE	IMPROVEMENT
CSCMS	N/A	1	1	1	3	1	3	3
MODIFICATION TRACKING SYSTEM	1	3	2*	2	2	2	2	1
MICAP ANALYSIS SYSTEM	N/A	2	2	3	1	3	1	2
ABSOLUTE PERFORMANCE IMPACT FOR SYSTEM WITH HIGHEST IMPACT (I.E. LOWEST SCORE)	LOW	HIGH	HIGH	HIGH	HIGH	HIGH	MEDIUM	HIGH

*From Configuration Control Viewpoint

FIGURE E-6. PERFORMANCE IMPACT

Analogously to the case for the risk assessment, the participants were asked to rate the absolute performance improvement (high, medium, or low) associated with the system having the most performance impact (lowest relative score) in each performance category. These evaluations are given in the bottom row of the matrix in Figure E-6.

After filling in the matrices to evaluate relative risk impact and relative performance impact for each system, the ALC representatives at the session were asked to identify which system they would choose if they could have only one of the systems. This question was to be answered independent of hardware requirements and first assuming that the system was transferred as it exists today at the RCC. They were then asked to choose one system but assume that only the generic capability would be transferred and that the ALC would be allowed to tailor the system to its own system peculiar requirements.

The ALC representatives were then asked to choose the two systems that they would most like to have transferred. Again they were to choose two systems assuming the systems would be transferred "as is" and then to choose under the assumption that the generic capabilities would be transferred but that the ALC's would be allowed to tailor the systems to their ALC peculiar requirements. Again, the choices were to be made independent of hardware considerations.

The resulting choices are shown in Figure E-7. Since the choices were to be non-attributive, ALC's are not identified.

Choice*	ALC 1	ALC 2	ALC 3	ALC 4	ALC 5	
Only One System	B	A	C	C	B	As Is Capability
	B	A	B	C	B	Generic Capability
Only Two Systems	B,C	B,A	B,C	B,C	B,A	As Is Capability
	B,C	B,A	B,C	B,C	B,A	Generic Capability

A = CSCMS

B = Modification Tracking System

C = MICAP Analysis System

*Choices Made Independent of Hardware Considerations.

FIGURE E-7. MOST WANTED SYSTEMS

	Resource deployment locations TAC/PACAF are running on their own computers Not sure how to handle Forward Support Base		

END

FILMED

3-83

DTIC